Figure 1

Effector Machine Structure used in Cyclic Graph Evolution

Input Module

m_1
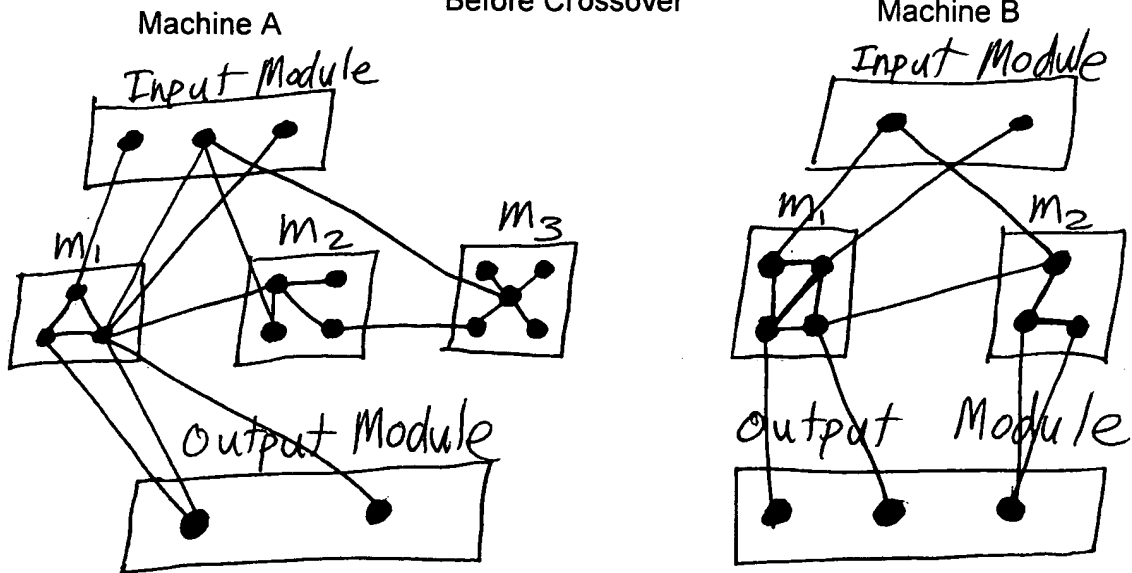
m_2

m_3

m_k

Output Module
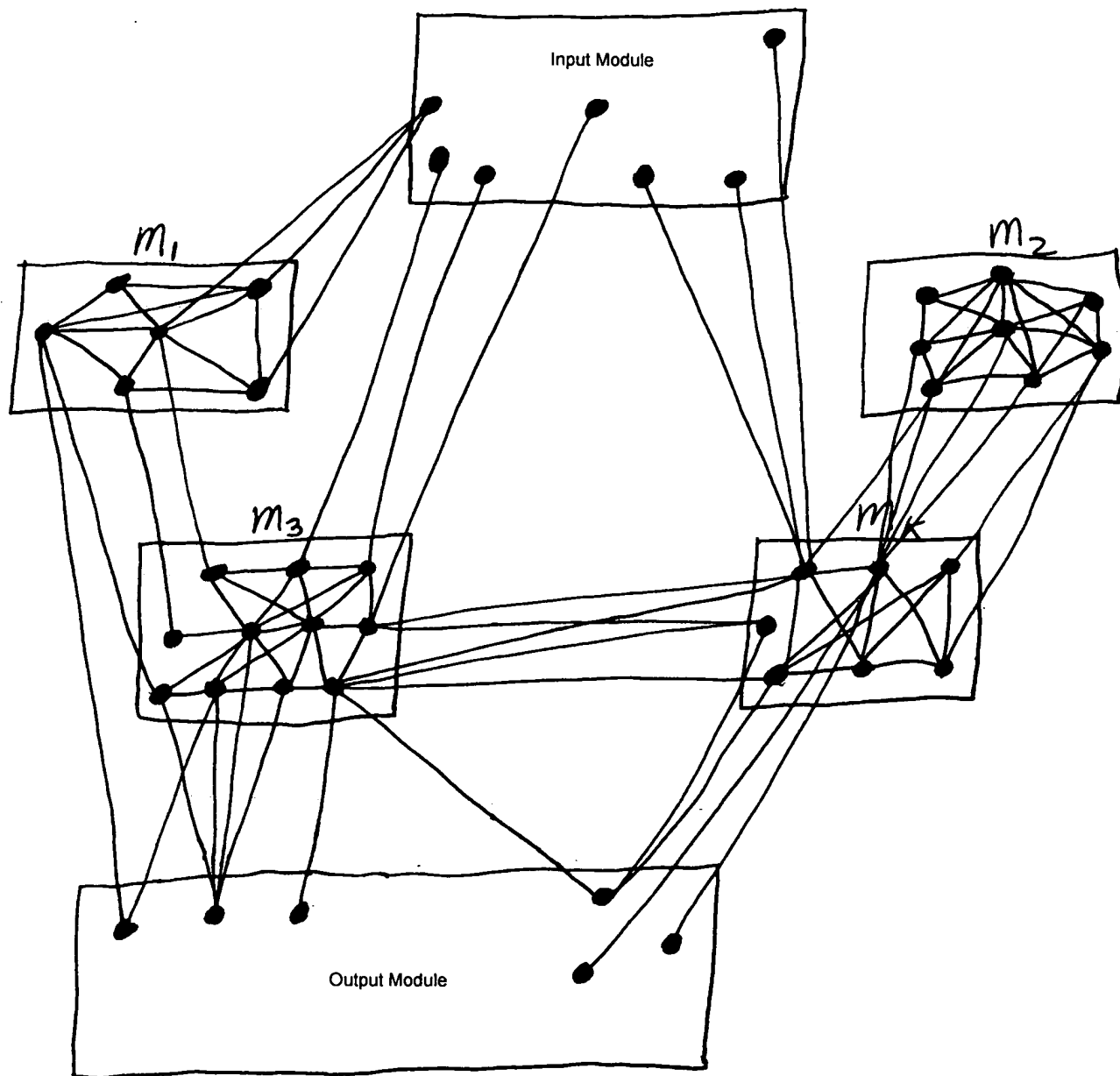
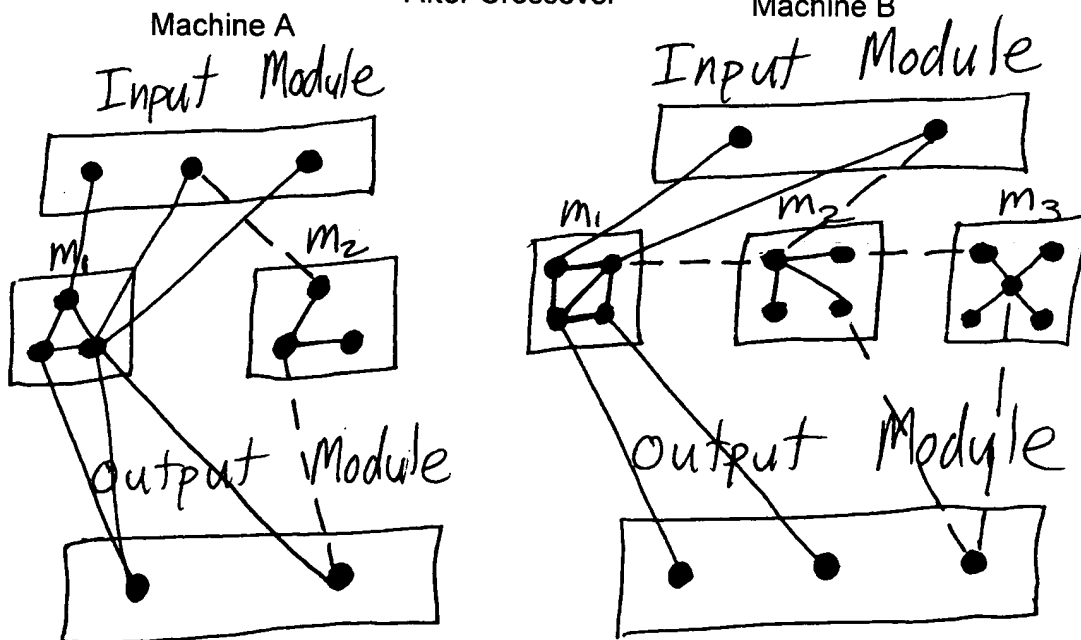Internal modules are labeled: $m_1, m_2, m_3, \ldots, m_k$

Internal connections lie completely with one rectangle, which represents one module. Non-zero external connections run from one module to another module. Effectors that have non-zero external connections to other modules are shown as large dots.

Figure 2
CGE Crossover

Before Crossover

Machine A

Input Module

m_1 m_2 m_3

Output Module

Machine B

Input Module

m_1 m_2

Output Module

After Crossover

Machine A

Input Module

m_1 m_2

Output Module

Machine B

Input Module

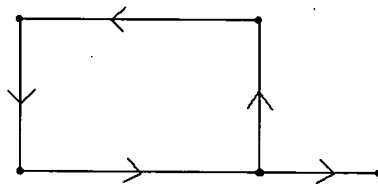m_1 m_2 m_3

Output Module

— — — new external connection

Figure 3

Directed Graphs

Cycle

No Cycle

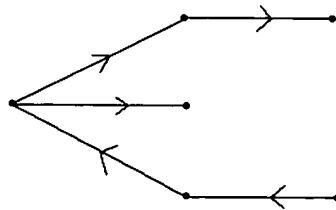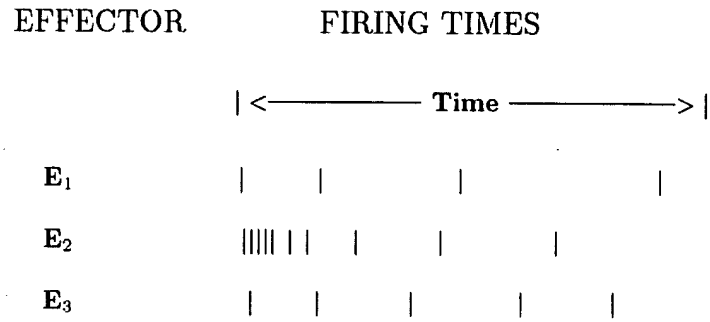# FIGURE 4

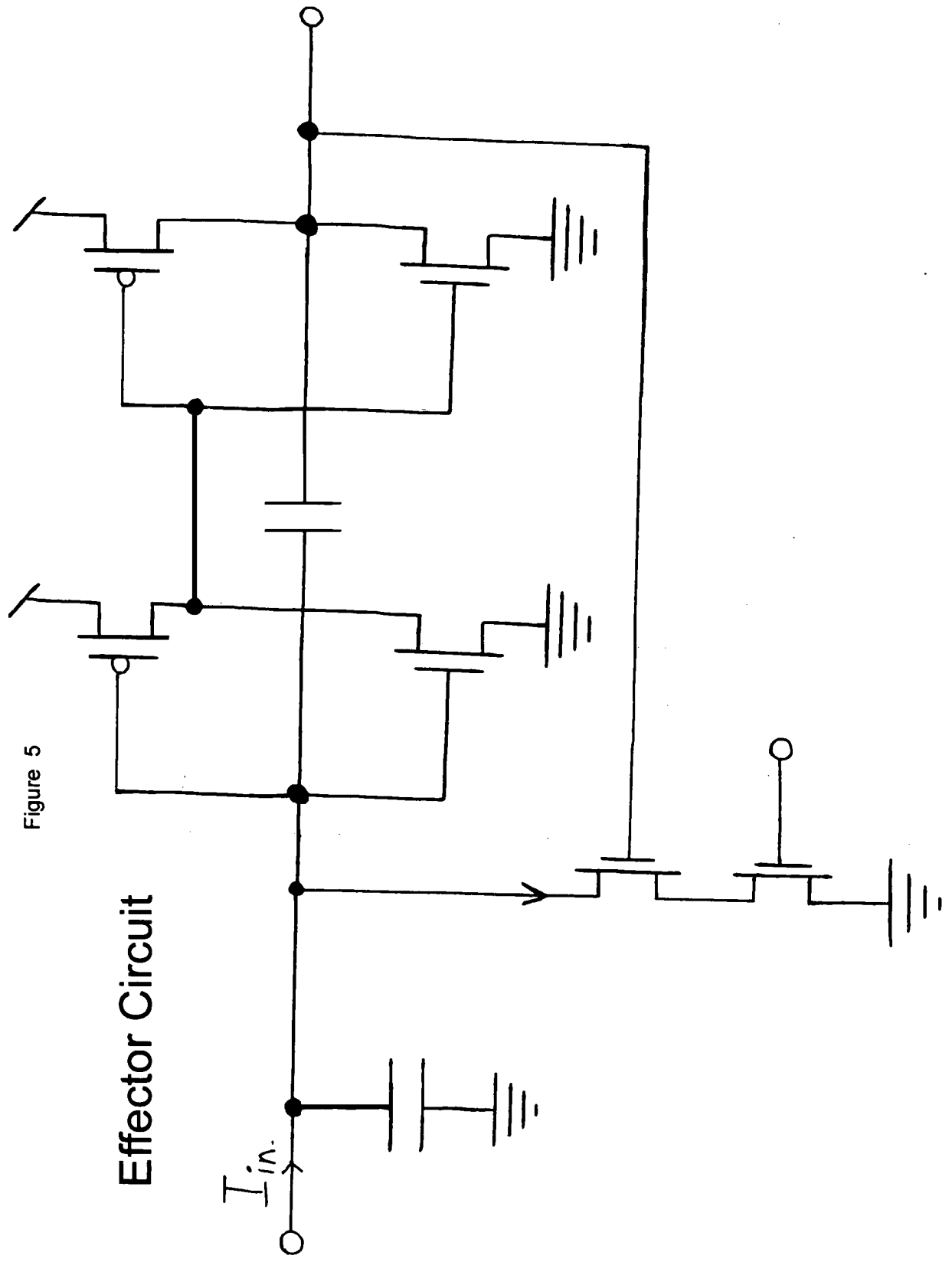## ERROR TOLERANCE IN EFFECTORS

EFFECTOR   FIRING TIMES

$|<$———————— Time ————————$>|$

E₁

E₂

E₃

Figure 5

Effector Circuit

$I_{in.}$